



**IC61S6432**

**Document Title**

64K x 32 Pipelined Sync. SRAM

**Revision History**

| <u>Revision No</u> | <u>History</u> | <u>Draft Date</u> | <u>Remark</u> |
|--------------------|----------------|-------------------|---------------|
| 0A                 | Initial Draft  | September 13,2001 |               |

The attached datasheets are provided by ICSI. Integrated Circuit Solution Inc reserve the right to change the specifications and products. ICSI will answer to your questions about device. If you have any questions, please contact the ICSI offices.

# 64K x 32 SYNCHRONOUS PIPELINE STATIC RAM

## FEATURES

- Internal self-timed write cycle
- Individual Byte Write Control and Global Write
- Clock controlled, registered address, data and control
- Pentium™ or linear burst sequence control using MODE input
- Three chip enables for simple depth expansion and address pipelining
- Common data inputs and data outputs
- Power-down control by ZZ input
- JEDEC 100-Pin LQFP and PQFP package
- Single +3.3V power supply
- Two Clock enables and one Clock disable to eliminate multiple bank bus contention
- Control pins mode upon power-up:
  - MODE in interleave burst mode
  - ZZ in normal operation mode
 These control pins can be connected to GNDQ or VCCQ to alter their power-up state
- Industrial temperature available

## DESCRIPTION

The *ICSI* IC61S6432 is a high-speed, low-power synchronous static RAM designed to provide a burstable, high-performance, secondary cache for the Pentium™, 680X0™, and PowerPC™ microprocessors. It is organized as 65,536 words by 32 bits, fabricated with *ICSI*'s advanced CMOS technology. The device integrates a 2-bit burst counter, high-speed SRAM core, and high-drive capability outputs into a single monolithic circuit. All synchronous inputs pass through registers controlled by a positive-edge-triggered single clock input.

Write cycles are internally self-timed and are initiated by the rising edge of the clock input. Write cycles can be from one to four bytes wide as controlled by the write control inputs.

Separate byte enables allow individual bytes to be written.  $\overline{BW1}$  controls DQ1-DQ8,  $\overline{BW2}$  controls DQ9-DQ16,  $\overline{BW3}$  controls DQ17-DQ24,  $\overline{BW4}$  controls DQ25-DQ32, conditioned by  $\overline{BWE}$  being LOW. A LOW on  $\overline{GW}$  input would cause all bytes to be written.

Bursts can be initiated with either  $\overline{ADSP}$  (Address Status Processor) or  $\overline{ADSC}$  (Address Status Cache Controller) input pins. Subsequent burst addresses can be generated internally by the IC61S6432 and controlled by the  $\overline{ADV}$  (burst address advance) input pin.

Asynchronous signals include output enable ( $\overline{OE}$ ), sleep mode input (ZZ), clock (CLK) and burst mode input (MODE). A HIGH input on the ZZ pin puts the SRAM in the power-down state. When ZZ is pulled LOW (or no connect), the SRAM normally operates after three cycles of the wake-up period. A LOW input, i.e., GNDQ, on MODE pin selects LINEAR Burst. A VCCQ (or no connect) on MODE pin selects INTERLEAVED Burst.

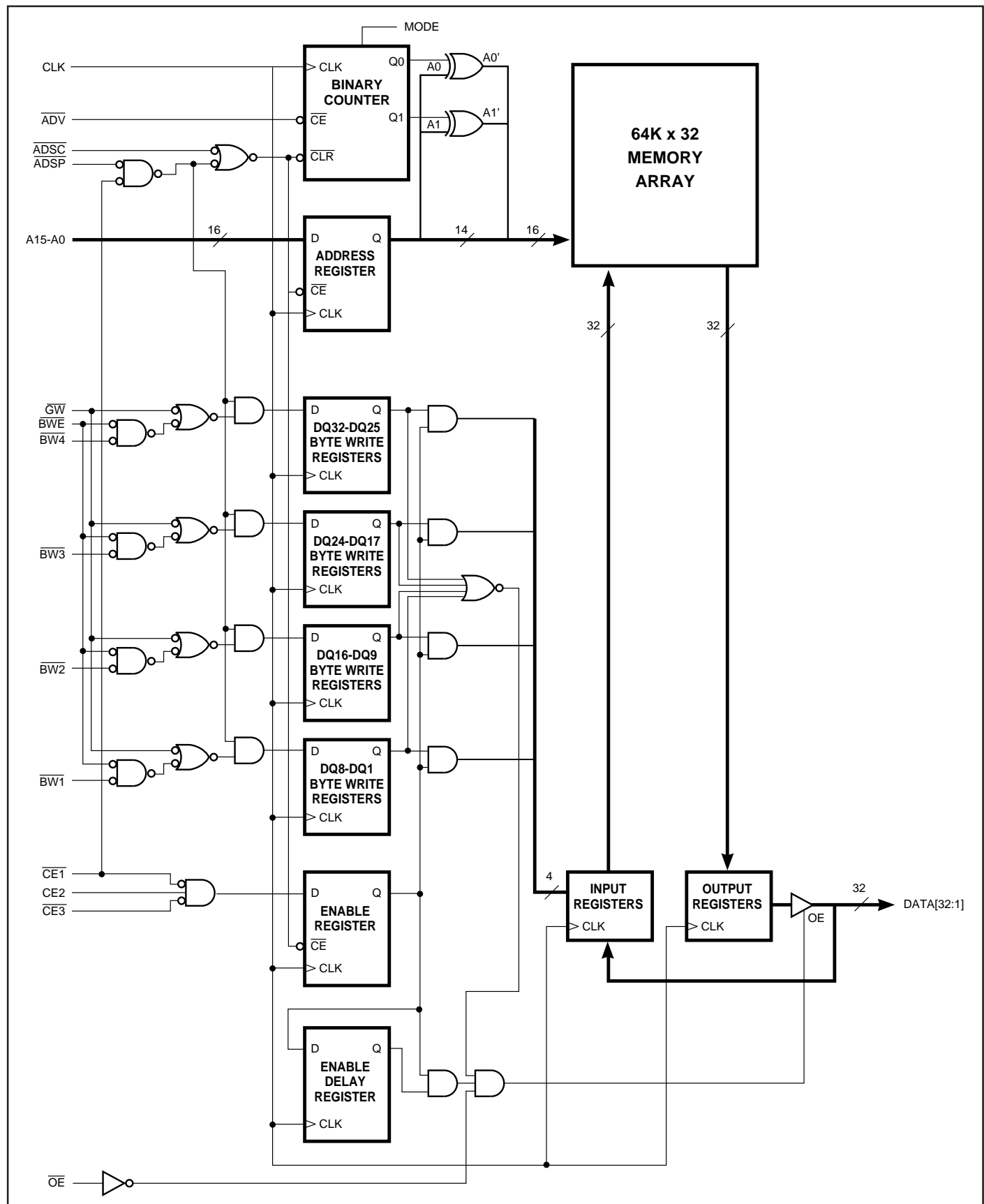
## FAST ACCESS TIME

| Symbol          | Parameter       | -200 <sup>(1)</sup> | -166 | -133 | -117 | -5  | -6 | -7 | -8 | Unit |
|-----------------|-----------------|---------------------|------|------|------|-----|----|----|----|------|
| t <sub>KQ</sub> | CLK Access Time | 4                   | 5    | 5    | 5    | 5   | 6  | 7  | 8  | ns   |
| t <sub>KC</sub> | Cycle Time      | 5                   | 6    | 7.5  | 8.5  | 10  | 12 | 13 | 15 | ns   |
| —               | Frequency       | 200                 | 166  | 133  | 117  | 100 | 83 | 75 | 66 | MHz  |

Note:

1. ADVANCE INFORMATION ONLY.

## BLOCK DIAGRAM





## TRUTH TABLE

| Operation                   | Address Used | $\overline{CE1}$ | CE2 | $\overline{CE3}$ | $\overline{ADSP}$ | $\overline{ADSC}$ | $\overline{ADV}$ | WRITE | $\overline{OE}$ | DQ     |
|-----------------------------|--------------|------------------|-----|------------------|-------------------|-------------------|------------------|-------|-----------------|--------|
| Deselected, Power-down      | None         | H                | X   | X                | X                 | L                 | X                | X     | X               | High-Z |
| Deselected, Power-down      | None         | L                | L   | X                | L                 | X                 | X                | X     | X               | High-Z |
| Deselected, Power-down      | None         | L                | X   | H                | L                 | X                 | X                | X     | X               | High-Z |
| Deselected, Power-down      | None         | L                | L   | X                | H                 | L                 | X                | X     | X               | High-Z |
| Deselected, Power-down      | None         | L                | X   | H                | H                 | L                 | X                | X     | X               | High-Z |
| Read Cycle, Begin Burst     | External     | L                | H   | L                | L                 | X                 | X                | X     | L               | Q      |
| Read Cycle, Begin Burst     | External     | L                | H   | L                | L                 | X                 | X                | X     | H               | High-Z |
| Write Cycle, Begin Burst    | External     | L                | H   | L                | H                 | L                 | X                | L     | X               | D      |
| Read Cycle, Begin Burst     | External     | L                | H   | L                | H                 | L                 | X                | H     | L               | Q      |
| Read Cycle, Begin Burst     | External     | L                | H   | L                | H                 | L                 | X                | H     | H               | High-Z |
| Read Cycle, Continue Burst  | Next         | X                | X   | X                | H                 | H                 | L                | H     | L               | Q      |
| Read Cycle, Continue Burst  | Next         | X                | X   | X                | H                 | H                 | L                | H     | H               | High-Z |
| Read Cycle, Continue Burst  | Next         | H                | X   | X                | X                 | H                 | L                | H     | L               | Q      |
| Read Cycle, Continue Burst  | Next         | H                | X   | X                | X                 | H                 | L                | H     | H               | High-Z |
| Write Cycle, Continue Burst | Next         | X                | X   | X                | H                 | H                 | L                | L     | X               | D      |
| Write Cycle, Continue Burst | Next         | H                | X   | X                | X                 | H                 | L                | L     | X               | D      |
| Read Cycle, Suspend Burst   | Current      | X                | X   | X                | H                 | H                 | H                | H     | L               | Q      |
| Read Cycle, Suspend Burst   | Current      | X                | X   | X                | H                 | H                 | H                | H     | H               | High-Z |
| Read Cycle, Suspend Burst   | Current      | H                | X   | X                | X                 | H                 | H                | H     | L               | Q      |
| Read Cycle, Suspend Burst   | Current      | H                | X   | X                | X                 | H                 | H                | H     | H               | High-Z |
| Write Cycle, Suspend Burst  | Current      | X                | X   | X                | H                 | H                 | H                | L     | X               | D      |
| Write Cycle, Suspend Burst  | Current      | H                | X   | X                | X                 | H                 | H                | L     | X               | D      |

## Notes:

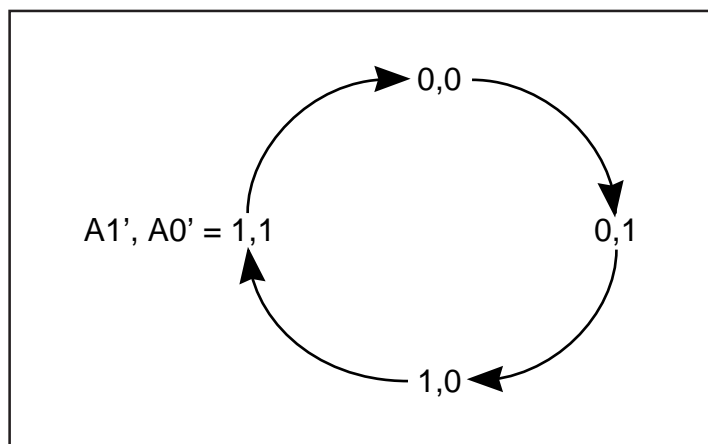
1. All inputs except  $\overline{OE}$  must meet setup and hold times for the Low-to-High transition of clock (CLK).
2. Wait states are inserted by suspending burst.
3. "X" means don't care. WRITE=L means any one or more byte write enable signals ( $\overline{BW1}$ - $\overline{BW4}$ ) and  $\overline{BWE}$  are LOW or  $\overline{GW}$  is LOW. WRITE=H means all byte write enable signals are HIGH.
4. For a Write operation following a Read operation,  $\overline{OE}$  must be HIGH before the input data required setup time and held HIGH throughout the input data hold time.
5.  $\overline{ADSP}$  LOW always initiates an internal READ at the Low-to-High edge of clock. A WRITE is performed by setting one or more byte write enable signals and  $\overline{BWE}$  LOW or  $\overline{GW}$  LOW for the subsequent L-H edge of clock.

## PARTIAL TRUTH TABLE

| Function        | $\overline{GW}$ | $\overline{BWE}$ | $\overline{BW1}$ | $\overline{BW2}$ | $\overline{BW3}$ | $\overline{BW4}$ |
|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|
| READ            | H               | H                | X                | X                | X                | X                |
| READ            | H               | X                | H                | H                | H                | H                |
| WRITE Byte 1    | H               | L                | L                | H                | H                | H                |
| WRITE All Bytes | X               | L                | L                | L                | L                | L                |
| WRITE All Bytes | L               | X                | X                | X                | X                | X                |

**INTERLEAVED BURST ADDRESS TABLE** (MODE = V<sub>CCQ</sub> or No Connect)

| External Address<br>A1 A0 | 1st Burst Address<br>A1 A0 | 2nd Burst Address<br>A1 A0 | 3rd Burst Address<br>A1 A0 |
|---------------------------|----------------------------|----------------------------|----------------------------|
| 00                        | 01                         | 10                         | 11                         |
| 01                        | 00                         | 11                         | 10                         |
| 10                        | 11                         | 00                         | 01                         |
| 11                        | 10                         | 01                         | 00                         |

**LINEAR BURST ADDRESS TABLE** (MODE = GND<sub>Q</sub>)

**ABSOLUTE MAXIMUM RATINGS**<sup>(1,2,3)</sup>

| Symbol                             | Parameter  | Value                          | Unit |
|------------------------------------|--|--------------------------------|------|
| T <sub>BIAS</sub>                  | Temperature Under Bias                                     | −10 to +85                     | °C   |
| T <sub>STG</sub>                   | Storage Temperature  | −55 to +150                    | °C   |
| P <sub>D</sub>                     | Power Dissipation  | 1.8                            | W    |
| I <sub>OUT</sub>                   | Output Current (per I/O)                                   | 100                            | mA   |
| V <sub>IN</sub> , V <sub>OUT</sub> | Voltage Relative to GND for I/O Pins                       | −0.5 to V <sub>CCQ</sub> + 0.3 | V    |
| V <sub>IN</sub>                    | Voltage Relative to GND for for Address and Control Inputs | −0.5 to 5.5                    | V    |

**Notes:**

1. Stress greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.
2. This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields; however, precautions may be taken to avoid application of any voltage higher than maximum rated voltages to this high-impedance circuit.
3. This device contains circuitry that will ensure the output devices are in High-Z at power up.

**OPERATING RANGE**

| Range      | Ambient Temperature | V <sub>CC</sub> |
|------------|---------------------|-----------------|
| Commercial | 0°C to +70°C        | 3.3V +10%, −5%  |
| Industrial | −40°C to +85°C      | 3.3V +10%, −5%  |

**DC ELECTRICAL CHARACTERISTICS<sup>(1,2)</sup>** (Over Operating Range)

| Symbol          | Parameter              | Test Conditions  |              | Min.      | Max.                   | Unit |
|-----------------|------------------------|--|--------------|-----------|------------------------|------|
| V <sub>OH</sub> | Output HIGH Voltage    | I <sub>OH</sub> = -5.0 mA  |              | 2.4       | —                      | V    |
| V <sub>OL</sub> | Output LOW Voltage     | I <sub>OL</sub> = 5.0 mA   |              | —         | 0.4                    | V    |
| V <sub>IH</sub> | Input HIGH Voltage     |  |              | 2.0       | V <sub>CCQ</sub> + 0.3 | V    |
| V <sub>IL</sub> | Input LOW Voltage      |  |              | -0.3      | 0.8                    | V    |
| I <sub>LI</sub> | Input Leakage Current  | GND ≤ V <sub>IN</sub> ≤ V <sub>CCQ</sub> <sup>(2)</sup>              | Com.<br>Ind. | -5<br>-10 | 5<br>10                | μA   |
| I <sub>LO</sub> | Output Leakage Current | GND ≤ V <sub>OUT</sub> ≤ V <sub>CCQ</sub> , $\overline{OE} = V_{IH}$ | Com.<br>Ind. | -5<br>-10 | 5<br>10                | μA   |

**Notes:**

1. MODE pin have an internal pull-up. ZZ pin has an internal pull-down. These pins may be a No Connect, tied to GND, or tied to V<sub>CCQ</sub>.
2. MODE pin should be tied to V<sub>CC</sub> or GND. They exhibit ±30 μA maximum leakage current when tied to ≤ GND + 0.2V or ≥ V<sub>CC</sub> - 0.2V.

**POWER SUPPLY CHARACTERISTICS** (Operating Range)

| Symbol          | Parameter                   | Test Conditions   |              | -200 <sup>(1)</sup> |          | -166   |          | -133   |          | -117   |            | Unit |
|-----------------|-----------------------------|---|--------------|---------------------|----------|--------|----------|--------|----------|--------|------------|------|
|                 |                             |   |              | Min.                | Max.     | Min.   | Max.     | Min.   | Max.     | Min.   | Max.       |      |
| I <sub>CC</sub> | AC Operating Supply Current | Device Selected,<br>All Inputs = V <sub>IL</sub> or V <sub>IH</sub><br>OE = V <sub>IH</sub> , Cycle Time ≥ t <sub>CC</sub> min. | Com.<br>Ind. | —<br>—              | 400<br>— | —<br>— | 215<br>— | —<br>— | 205<br>— | —<br>— | 195<br>205 | mA   |
| I <sub>SB</sub> | Standby Current             | Device Deselected,<br>V <sub>CC</sub> = Max.,<br>CLK Cycle Time ≥ t <sub>CC</sub> min.  | Com.<br>Ind. | —<br>—              | 100<br>— | —<br>— | 70<br>—  | —<br>— | 60<br>—  | —<br>— | 50<br>60   | mA   |
| I <sub>ZZ</sub> | Power-Down Mode Current     | ZZ = V <sub>CCQ</sub> , CLK Running<br>All Inputs ≤ GND + 0.2V<br>or ≥ V <sub>CC</sub> - 0.2V                                   | Com.<br>Ind. | —<br>—              | 5<br>—   | —<br>— | 5<br>—   | —<br>— | 5<br>—   | —<br>— | 5<br>10    | mA   |

**Note:**

1. ADVANCE INFORMATION ONLY.

| Symbol          | Parameter                   | Test Conditions   |              | -5     |            | -6     |            | -7     |            | -8     |            | Unit |
|-----------------|-----------------------------|---|--------------|--------|------------|--------|------------|--------|------------|--------|------------|------|
|                 |                             |   |              | Min.   | Max.       | Min.   | Max.       | Min.   | Max.       | Min.   | Max.       |      |
| I <sub>CC</sub> | AC Operating Supply Current | Device Selected,<br>All Inputs = V <sub>IL</sub> or V <sub>IH</sub><br>OE = V <sub>IH</sub> , Cycle Time ≥ t <sub>CC</sub> min. | Com.<br>Ind. | —<br>— | 175<br>185 | —<br>— | 165<br>175 | —<br>— | 150<br>160 | —<br>— | 140<br>150 | mA   |
| I <sub>SB</sub> | Standby Current             | Device Deselected,<br>V <sub>CC</sub> = Max.,<br>CLK Cycle Time ≥ t <sub>CC</sub> min.  | Com.<br>Ind. | —<br>— | 25<br>35   | —<br>— | 25<br>35   | —<br>— | 25<br>35   | —<br>— | 25<br>35   | mA   |
| I <sub>ZZ</sub> | Power-Down Mode Current     | ZZ = V <sub>CCQ</sub> , CLK Running<br>All Inputs ≤ GND + 0.2V<br>or ≥ V <sub>CC</sub> - 0.2V                                   | Com.<br>Ind. | —<br>— | 5<br>10    | —<br>— | 5<br>10    | —<br>— | 5<br>10    | —<br>— | 5<br>10    | mA   |

CAPACITANCE<sup>(1,2)</sup>

| Symbol           | Parameter                | Conditions            | Max. | Unit |
|------------------|--------------------------|-----------------------|------|------|
| C <sub>IN</sub>  | Input Capacitance        | V <sub>IN</sub> = 0V  | 6    | pF   |
| C <sub>OUT</sub> | Input/Output Capacitance | V <sub>OUT</sub> = 0V | 8    | pF   |

Notes:

- 1. Tested initially and after any design or process changes that may affect these parameters.
- 2. Test conditions: T<sub>A</sub> = 25°C, f = 1 MHz, V<sub>CC</sub> = 3.3V.

AC TEST CONDITIONS

| Parameter                                   | Unit                |
|---|---------------------|
| Input Pulse Level                           | 0V to 3.0V          |
| Input Rise and Fall Times                   | 1.5 ns              |
| Input and Output Timing and Reference Level | 1.5V                |
| Output Load                                 | See Figures 1 and 2 |

AC TEST LOADS

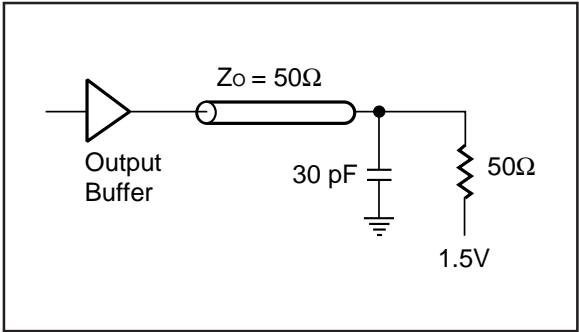


Figure 1

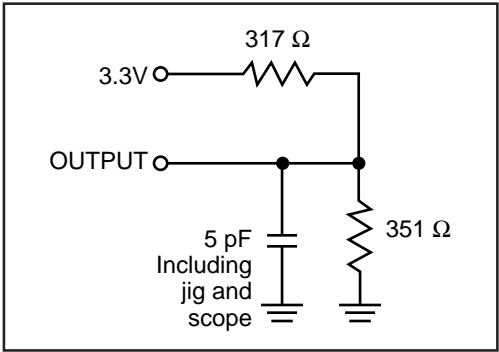


Figure 2

## READ CYCLE SWITCHING CHARACTERISTICS (Over Operating Range)

| Symbol                             | Parameter                        | -200 <sup>(1)</sup> |      | -166 |      | -133 |      | -117 |      | Unit |
|------------------------------------|----------------------------------|---------------------|------|------|------|------|------|------|------|------|
|                                    |                                  | Min.                | Max. | Min. | Max. | Min. | Max. | Min. | Max. |      |
| t <sub>kc</sub>                    | Cycle Time                       | 5                   | —    | 6    | —    | 7.5  | —    | 8.5  | —    | ns   |
| t <sub>kH</sub>                    | Clock High Time                  | 1.6                 | —    | 2.4  | —    | 2.8  | —    | 3    | —    | ns   |
| t <sub>kL</sub>                    | Clock Low Time                   | 1.6                 | —    | 2.4  | —    | 2.8  | —    | 3    | —    | ns   |
| t <sub>kQ</sub>                    | Clock Access Time                | —                   | 4    | —    | 5    | —    | 5    | —    | 5    | ns   |
| t <sub>kQX</sub> <sup>(2)</sup>    | Clock High to Output Invalid     | 1                   | —    | 1.5  | —    | 1.5  | —    | 1.5  | —    | ns   |
| t <sub>kQLZ</sub> <sup>(2,3)</sup> | Clock High to Output Low-Z       | 0                   | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>kQHZ</sub> <sup>(2,3)</sup> | Clock High to Output High-Z      | 1                   | 3.5  | 1.5  | 5    | 1.5  | 5    | 1.5  | 6    | ns   |
| t <sub>oEQ</sub>                   | Output Enable to Output Valid    | —                   | 3.5  | —    | 5    | —    | 5    | —    | 5    | ns   |
| t <sub>oEQX</sub> <sup>(2)</sup>   | Output Disable to Output Invalid | 0                   | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>oELZ</sub> <sup>(2,3)</sup> | Output Enable to Output Low-Z    | 0                   | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>oEHZ</sub> <sup>(2,3)</sup> | Output Disable to Output High-Z  | —                   | 3    | —    | 3    | —    | 3    | —    | 4    | ns   |
| t <sub>as</sub>                    | Address Setup Time               | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>ss</sub>                    | Address Status Setup Time        | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>ws</sub>                    | Write Setup Time                 | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>ces</sub>                   | Chip Enable Setup Time           | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>avs</sub>                   | Address Advance Setup Time       | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>ah</sub>                    | Address Hold Time                | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>sh</sub>                    | Address Status Hold Time         | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>wh</sub>                    | Write Hold Time                  | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>ceh</sub>                   | Chip Enable Hold Time            | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>avh</sub>                   | Address Advance Hold Time        | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>cfg</sub> <sup>(4)</sup>    | Configuration Setup              | 25                  | —    | 25   | —    | 30   | —    | 35   | —    | ns   |

### Notes:

1. **ADVANCE INFORMATION ONLY.**

2. Guaranteed but not 100% tested. This parameter is periodically sampled.

3. Tested with load in Figure 2.

4. Configuration signal MODE is static and must not change during normal operation.

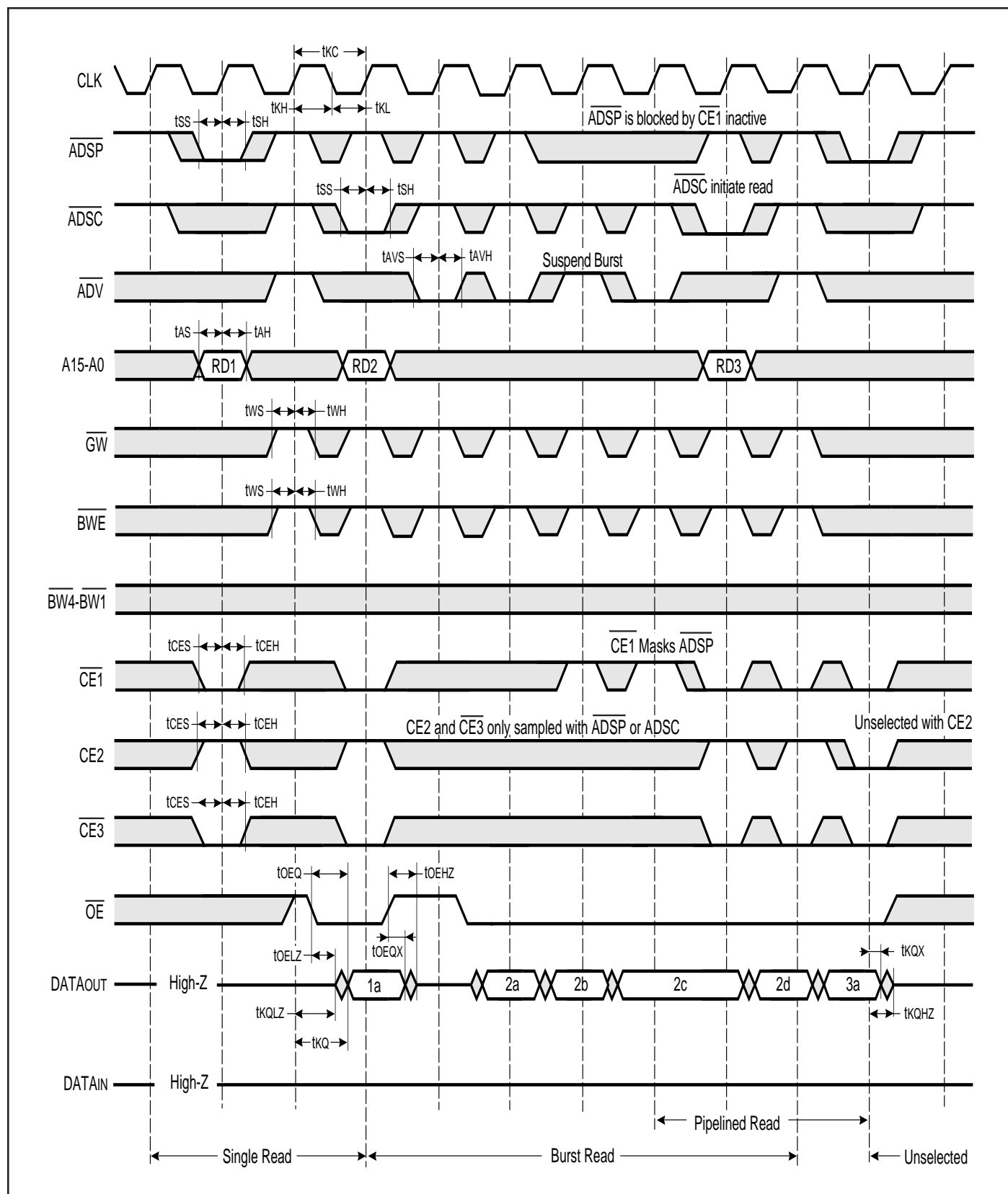
**READ CYCLE SWITCHING CHARACTERISTICS** (Over Operating Range) *(Continued)*

| Symbol                             | Parameter                        | -5   |      | -6   |      | -7   |      | -8   |      | Unit |
|------------------------------------|----------------------------------|------|------|------|------|------|------|------|------|------|
|                                    |                                  | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |      |
| t <sub>KC</sub>                    | Cycle Time                       | 10   | —    | 12   | —    | 13   | —    | 15   | —    | ns   |
| t <sub>KH</sub>                    | Clock High Time                  | 3.5  | —    | 4    | —    | 6    | —    | 6    | —    | ns   |
| t <sub>KL</sub>                    | Clock Low Time                   | 3.5  | —    | 4    | —    | 6    | —    | 6    | —    | ns   |
| t <sub>KQ</sub>                    | Clock Access Time                | —    | 5    | —    | 6    | —    | 7    | —    | 8    | ns   |
| t <sub>KQX</sub> <sup>(1)</sup>    | Clock High to Output Invalid     | 1.5  | —    | 1.5  | —    | 2    | —    | 2    | —    | ns   |
| t <sub>KQLZ</sub> <sup>(1,2)</sup> | Clock High to Output Low-Z       | 0    | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>KQHZ</sub> <sup>(1,2)</sup> | Clock High to Output High-Z      | 1.5  | 6    | 1.5  | 6    | 2    | 6    | 2    | 6    | ns   |
| t <sub>OEQ</sub>                   | Output Enable to Output Valid    | —    | 5    | —    | 6    | —    | 6    | —    | 6    | ns   |
| t <sub>OEQX</sub> <sup>(1)</sup>   | Output Disable to Output Invalid | 0    | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>OELZ</sub> <sup>(1,2)</sup> | Output Enable to Output Low-Z    | 0    | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>OEHZ</sub> <sup>(1,2)</sup> | Output Disable to Output High-Z  | —    | 4    | —    | 5    | —    | 6    | —    | 6    | ns   |
| t <sub>AS</sub>                    | Address Setup Time               | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>SS</sub>                    | Address Status Setup Time        | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>WS</sub>                    | Write Setup Time                 | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>CES</sub>                   | Chip Enable Setup Time           | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>AVS</sub>                   | Address Advance Setup Time       | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>AH</sub>                    | Address Hold Time                | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>SH</sub>                    | Address Status Hold Time         | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>WH</sub>                    | Write Hold Time                  | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>CEH</sub>                   | Chip Enable Hold Time            | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>AVH</sub>                   | Address Advance Hold Time        | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>CFG</sub> <sup>(3)</sup>    | Configuration Setup              | 35   | —    | 45   | —    | 66.7 | —    | 80   | —    | ns   |

**Notes:**

1. Guaranteed but not 100% tested. This parameter is periodically sampled.
2. Tested with load in Figure 2.
3. Configuration signal MODE is static and must not change during normal operation.

## READ CYCLE TIMING: PIPELINE



## WRITE CYCLE SWITCHING CHARACTERISTICS (Over Operating Range)

| Symbol                          | Parameter                  | -200 <sup>(1)</sup> |      | -166 |      | -133 |      | -117 |      | Unit |
|---------------------------------|----------------------------|---------------------|------|------|------|------|------|------|------|------|
|                                 |                            | Min.                | Max. | Min. | Max. | Min. | Max. | Min. | Max. |      |
| t <sub>kc</sub>                 | Cycle Time                 | 5                   | —    | 6    | —    | 7.5  | —    | 8.5  | —    | ns   |
| t <sub>kH</sub>                 | Clock High Time            | 1.6                 | —    | 2.4  | —    | 2.8  | —    | 3    | —    | ns   |
| t <sub>kL</sub>                 | Clock Low Time             | 1.6                 | —    | 2.4  | —    | 2.8  | —    | 3    | —    | ns   |
| t <sub>AS</sub>                 | Address Setup Time         | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>SS</sub>                 | Address Status Setup Time  | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>WS</sub>                 | Write Setup Time           | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>DS</sub>                 | Data In Setup Time         | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>CES</sub>                | Chip Enable Setup Time     | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>AVS</sub>                | Address Advance Setup Time | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>AH</sub>                 | Address Hold Time          | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>SH</sub>                 | Address Status Hold Time   | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>DH</sub>                 | Data In Hold Time          | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>WH</sub>                 | Write Hold Time            | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>CEH</sub>                | Chip Enable Hold Time      | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>AVH</sub>                | Address Advance Hold Time  | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>CFG</sub> <sup>(2)</sup> | Configuration Setup        | 25                  | —    | 25   | —    | 30   | —    | 35   | —    | ns   |

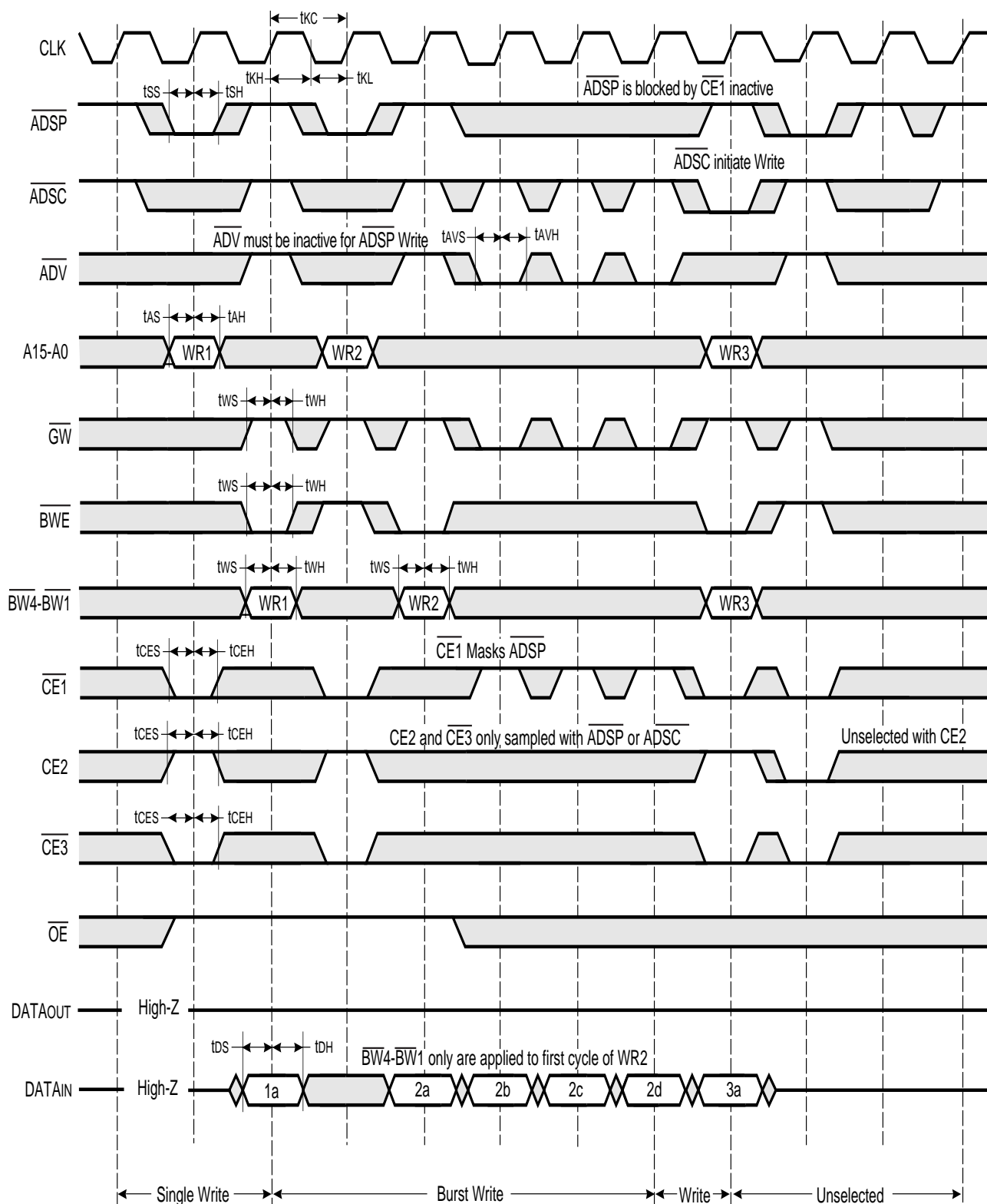
| Symbol                          | Parameter                  | -5   |      | -6   |      | -7   |      | -8   |      | Unit |
|---------------------------------|----------------------------|------|------|------|------|------|------|------|------|------|
|                                 |                            | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |      |
| t <sub>kc</sub>                 | Cycle Time                 | 10   | —    | 12   | —    | 13   | —    | 15   | —    | ns   |
| t <sub>kH</sub>                 | Clock High Time            | 3.5  | —    | 4    | —    | 6    | —    | 6    | —    | ns   |
| t <sub>kL</sub>                 | Clock Low Time             | 3.5  | —    | 4    | —    | 6    | —    | 6    | —    | ns   |
| t <sub>AS</sub>                 | Address Setup Time         | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>SS</sub>                 | Address Status Setup Time  | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>WS</sub>                 | Write Setup Time           | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>DS</sub>                 | Data In Setup Time         | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>CES</sub>                | Chip Enable Setup Time     | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>AVS</sub>                | Address Advance Setup Time | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>AH</sub>                 | Address Hold Time          | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>SH</sub>                 | Address Status Hold Time   | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>DH</sub>                 | Data In Hold Time          | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>WH</sub>                 | Write Hold Time            | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>CEH</sub>                | Chip Enable Hold Time      | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>AVH</sub>                | Address Advance Hold Time  | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>CFG</sub> <sup>(2)</sup> | Configuration Setup        | 35   | —    | 45   | —    | 52   | —    | 60   | —    | ns   |

**Note:**

1. ADVANCE INFORMATION ONLY.

2. Configuration signal MODE is static and must not change during normal operation.

## WRITE CYCLE TIMING



**READ/WRITE CYCLE SWITCHING CHARACTERISTICS** (Over Operating Range)

| Symbol                             | Parameter                        | -200 <sup>(1)</sup> |      | -166 |      | -133 |      | -117 |      | Unit |
|------------------------------------|----------------------------------|---------------------|------|------|------|------|------|------|------|------|
|                                    |                                  | Min.                | Max. | Min. | Max. | Min. | Max. | Min. | Max. |      |
| t <sub>KC</sub>                    | Cycle Time                       | 5                   | —    | 6    | —    | 7.5  | —    | 8.5  | —    | ns   |
| t <sub>KH</sub>                    | Clock High Time                  | 1.6                 | —    | 2.4  | —    | 2.8  | —    | 3    | —    | ns   |
| t <sub>KL</sub>                    | Clock Low Time                   | 1.6                 | —    | 2.4  | —    | 2.8  | —    | 3    | —    | ns   |
| t <sub>KQ</sub>                    | Clock Access Time                | —                   | 4    | —    | 5    | —    | 5    | —    | 5    | ns   |
| t <sub>KQX</sub> <sup>(2)</sup>    | Clock High to Output Invalid     | 1                   | —    | 1.5  | —    | 1.5  | —    | 1.5  | —    | ns   |
| t <sub>KQLZ</sub> <sup>(2,3)</sup> | Clock High to Output Low-Z       | —                   | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>KQHZ</sub> <sup>(2,3)</sup> | Clock High to Output High-Z      | 1                   | 3.5  | 1.5  | 5    | 1.5  | 5    | 1.5  | 6    | ns   |
| t <sub>OEQ</sub>                   | Output Enable to Output Valid    | —                   | 3.5  | —    | 5    | —    | 5    | —    | 5    | ns   |
| t <sub>OEQX</sub> <sup>(2)</sup>   | Output Disable to Output Invalid | 0                   | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>OELZ</sub> <sup>(2,3)</sup> | Output Enable to Output Low-Z    | 0                   | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>OEHZ</sub> <sup>(2,3)</sup> | Output Disable to Output High-Z  | —                   | 3    | —    | 3    | —    | 3    | —    | 4    | ns   |
| t <sub>AS</sub>                    | Address Setup Time               | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>SS</sub>                    | Address Status Setup Time        | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>WS</sub>                    | Write Setup Time                 | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>CES</sub>                   | Chip Enable Setup Time           | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>AH</sub>                    | Address Hold Time                | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>SH</sub>                    | Address Status Hold Time         | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>WH</sub>                    | Write Hold Time                  | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>CEH</sub>                   | Chip Enable Hold Time            | 0.5                 | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>CFG</sub> <sup>(4)</sup>    | Configuration Setup              | 25                  | —    | 25   | —    | 30   | —    | 35   | —    | ns   |

**Notes:**1. **ADVANCE INFORMATION ONLY.**

2. Guaranteed but not 100% tested. This parameter is periodically sampled.

3. Tested with load in Figure 2.

4. Configuration signal MODE is static and must not change during normal operation.

**READ/WRITE CYCLE SWITCHING CHARACTERISTICS** (Over Operating Range) (Continued)

| Symbol                             | Parameter                        | -5   |      | -6   |      | -7   |      | -8   |      | Unit |
|------------------------------------|----------------------------------|------|------|------|------|------|------|------|------|------|
|                                    |                                  | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |      |
| t <sub>KC</sub>                    | Cycle Time                       | 10   | —    | 12   | —    | 13   | —    | 15   | —    | ns   |
| t <sub>KH</sub>                    | Clock High Time                  | 3.5  | —    | 4    | —    | 6    | —    | 6    | —    | ns   |
| t <sub>KL</sub>                    | Clock Low Time                   | 3.5  | —    | 4    | —    | 6    | —    | 6    | —    | ns   |
| t <sub>KQ</sub>                    | Clock Access Time                | —    | 5    | —    | 6    | —    | 7    | —    | 8    | ns   |
| t <sub>KQX</sub> <sup>(1)</sup>    | Clock High to Output Invalid     | 1.5  | —    | 1.5  | —    | 2    | —    | 2    | —    | ns   |
| t <sub>KQLZ</sub> <sup>(1,2)</sup> | Clock High to Output Low-Z       | 0    | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>KQHZ</sub> <sup>(1,2)</sup> | Clock High to Output High-Z      | 1.5  | 6    | 1.5  | 6    | 2    | 6    | 2    | 6    | ns   |
| t <sub>OEQ</sub>                   | Output Enable to Output Valid    | —    | 5    | —    | 6    | —    | 6    | —    | 6    | ns   |
| t <sub>OEQX</sub> <sup>(1)</sup>   | Output Disable to Output Invalid | 0    | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>OELZ</sub> <sup>(1,2)</sup> | Output Enable to Output Low-Z    | 0    | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>OEHZ</sub> <sup>(1,2)</sup> | Output Disable to Output High-Z  | —    | 4    | —    | 5    | —    | 6    | —    | 6    | ns   |
| t <sub>AS</sub>                    | Address Setup Time               | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>SS</sub>                    | Address Status Setup Time        | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>WS</sub>                    | Write Setup Time                 | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>CES</sub>                   | Chip Enable Setup Time           | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>AH</sub>                    | Address Hold Time                | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>SH</sub>                    | Address Status Hold Time         | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>WH</sub>                    | Write Hold Time                  | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>CEH</sub>                   | Chip Enable Hold Time            | 0.5  | —    | 0.5  | —    | 0.5  | —    | 0.5  | —    | ns   |
| t <sub>CFG</sub> <sup>(3)</sup>    | Configuration Setup              | 35   | —    | 45   | —    | 52   | —    | 60   | —    | ns   |

**Notes:**

1. Guaranteed but not 100% tested. This parameter is periodically sampled.
2. Tested with load in Figure 2.
3. Configuration signal MODE is static and must not change during normal operation.

The timing diagram for the AD9080 illustrates the relationship between various control and data signals during different operational modes. The signals shown are CLK, ADSP, ADSC, ADV, A15-A0, GW, BWE, BW4-BW1, CE1, CE2, CE3, OE, DATAOUT, and DATAIN. The diagram is divided into four main sections: Single Read, Single Write, Burst Read, and Unselected.

**Single Read:** This section shows the timing for a single read operation. Key parameters include  $t_{SS}$  (setup time before ADSP),  $t_{SH}$  (hold time after ADSP),  $t_{KH}$  (hold time before ADSC), and  $t_{KL}$  (hold time after ADSC). The ADSP signal is active (low) during this period. The A15-A0 bus shows RD1 (Read Data 1) and WR1 (Write Data 1). The GW (Global Write) and BWE (Burst Write Enable) signals are active (low) during this period. The BW4-BW1 bus shows WR1 (Write Data 1). The CE1 (Chip Enable 1) signal is active (low) during this period. The CE2 and CE3 signals are inactive (high) during this period. The OE (Output Enable) signal is active (low) during this period. The DATAOUT signal is active (low) during this period. The DATAIN signal is inactive (high) during this period.

**Single Write:** This section shows the timing for a single write operation. Key parameters include  $t_{AS}$  (setup time before ADV),  $t_{AH}$  (hold time after ADV),  $t_{WS}$  (setup time before GW), and  $t_{WH}$  (hold time after GW). The ADV signal is active (low) during this period. The A15-A0 bus shows WR1 (Write Data 1). The GW signal is active (low) during this period. The BWE signal is active (low) during this period. The BW4-BW1 bus shows WR1 (Write Data 1). The CE1 signal is active (low) during this period. The CE2 and CE3 signals are inactive (high) during this period. The OE signal is active (low) during this period. The DATAOUT signal is inactive (high) during this period. The DATAIN signal is active (low) during this period.

**Burst Read:** This section shows the timing for a burst read operation. Key parameters include  $t_{CES}$  (setup time before CE1),  $t_{CEH}$  (hold time after CE1),  $t_{OEQ}$  (output enable delay),  $t_{OELZ}$  (output enable delay to high-Z),  $t_{OEQX}$  (output enable delay to high-Z),  $t_{KQX}$  (output delay),  $t_{KQHZ}$  (output delay to high-Z),  $t_{KQLZ}$  (output delay to high-Z),  $t_{KQ}$  (output delay), and  $t_{DS}$  (output delay). The ADSP signal is active (low) during this period. The A15-A0 bus shows RD2 (Read Data 2) and RD3 (Read Data 3). The GW signal is active (low) during this period. The BWE signal is active (low) during this period. The BW4-BW1 bus shows WR1 (Write Data 1). The CE1 signal is active (low) during this period. The CE2 and CE3 signals are inactive (high) during this period. The OE signal is active (low) during this period. The DATAOUT signal is active (low) during this period. The DATAIN signal is inactive (high) during this period.

**Unselected:** This section shows the timing for an unselected state. Key parameters include  $t_{KQX}$  (output delay) and  $t_{KQHZ}$  (output delay to high-Z). The ADSP signal is inactive (high) during this period. The A15-A0 bus is inactive (high) during this period. The GW signal is inactive (high) during this period. The BWE signal is inactive (high) during this period. The BW4-BW1 bus is inactive (high) during this period. The CE1 signal is inactive (high) during this period. The CE2 and CE3 signals are inactive (high) during this period. The OE signal is inactive (high) during this period. The DATAOUT signal is inactive (high) during this period. The DATAIN signal is inactive (high) during this period.

**SNOOZE AND RECOVERY CYCLE SWITCHING CHARACTERISTICS<sup>(1)</sup>** (Over Operating Range)

| Symbol                             | Parameter                        | -200 <sup>(2)</sup> |      | -166 |      | -133 |      | -117 |      | Unit |
|------------------------------------|----------------------------------|---------------------|------|------|------|------|------|------|------|------|
|                                    |                                  | Min.                | Max. | Min. | Max. | Min. | Max. | Min. | Max. |      |
| t <sub>KC</sub>                    | Cycle Time                       | 5                   | —    | 6    | —    | 7.5  | —    | 8.5  | —    | ns   |
| t <sub>KH</sub>                    | Clock High Time                  | 1.6                 | —    | 2.4  | —    | 2.8  | —    | 3    | —    | ns   |
| t <sub>KL</sub>                    | Clock Low Time                   | 1.6                 | —    | 2.4  | —    | 2.8  | —    | 3    | —    | ns   |
| t <sub>KQ</sub>                    | Clock Access Time                | —                   | 4    | —    | 5    | —    | 5    | —    | 5    | ns   |
| t <sub>KQX</sub> <sup>(3)</sup>    | Clock High to Output Invalid     | 1                   | —    | 1.5  | —    | 1.5  | —    | 1.5  | —    | ns   |
| t <sub>KQLZ</sub> <sup>(3,4)</sup> | Clock High to Output Low-Z       | 0                   | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>KQHZ</sub> <sup>(3,4)</sup> | Clock High to Output High-Z      | 1                   | 3.5  | 1.5  | 5    | 1.5  | 5    | 1.5  | 6    | ns   |
| t <sub>OEQ</sub>                   | Output Enable to Output Valid    | —                   | 3.5  | —    | 5    | —    | 5    | —    | 5    | ns   |
| t <sub>OEQX</sub> <sup>(3)</sup>   | Output Disable to Output Invalid | 0                   | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>OELZ</sub> <sup>(3,4)</sup> | Output Enable to Output Low-Z    | 0                   | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>OEHZ</sub> <sup>(3,4)</sup> | Output Disable to Output High-Z  | —                   | 3    | —    | 3    | —    | 3    | —    | 4    | ns   |
| t <sub>AS</sub>                    | Address Setup Time               | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>SS</sub>                    | Address Status Setup Time        | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>CES</sub>                   | Chip Enable Setup Time           | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>AH</sub>                    | Address Hold Time                | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>SH</sub>                    | Address Status Hold Time         | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>CEH</sub>                   | Chip Enable Hold Time            | 2                   | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>ZZS</sub> <sup>(5)</sup>    | ZZ Standby                       | —                   | 8    | 2    | —    | 2    | —    | 2    | —    | cyc  |
| t <sub>ZZREC</sub> <sup>(6)</sup>  | ZZ Recovery                      | 8                   | —    | 2    | —    | 2    | —    | 2    | —    | cyc  |

**Notes:**

1. Configuration signal MODE is static and must not change during normal operation.
2. **ADVANCE INFORMATION ONLY.**
3. Guaranteed but not 100% tested. This parameter is periodically sampled.
4. Tested with load in Figure 2.
5. The assertion of ZZ allows the SRAM to enter a lower power state than when deselected within the time specified. Data retention is guaranteed when ZZ is asserted and clock remains active.
6. ADSC and ADSP must not be asserted for at least two cycles after leaving ZZ state.

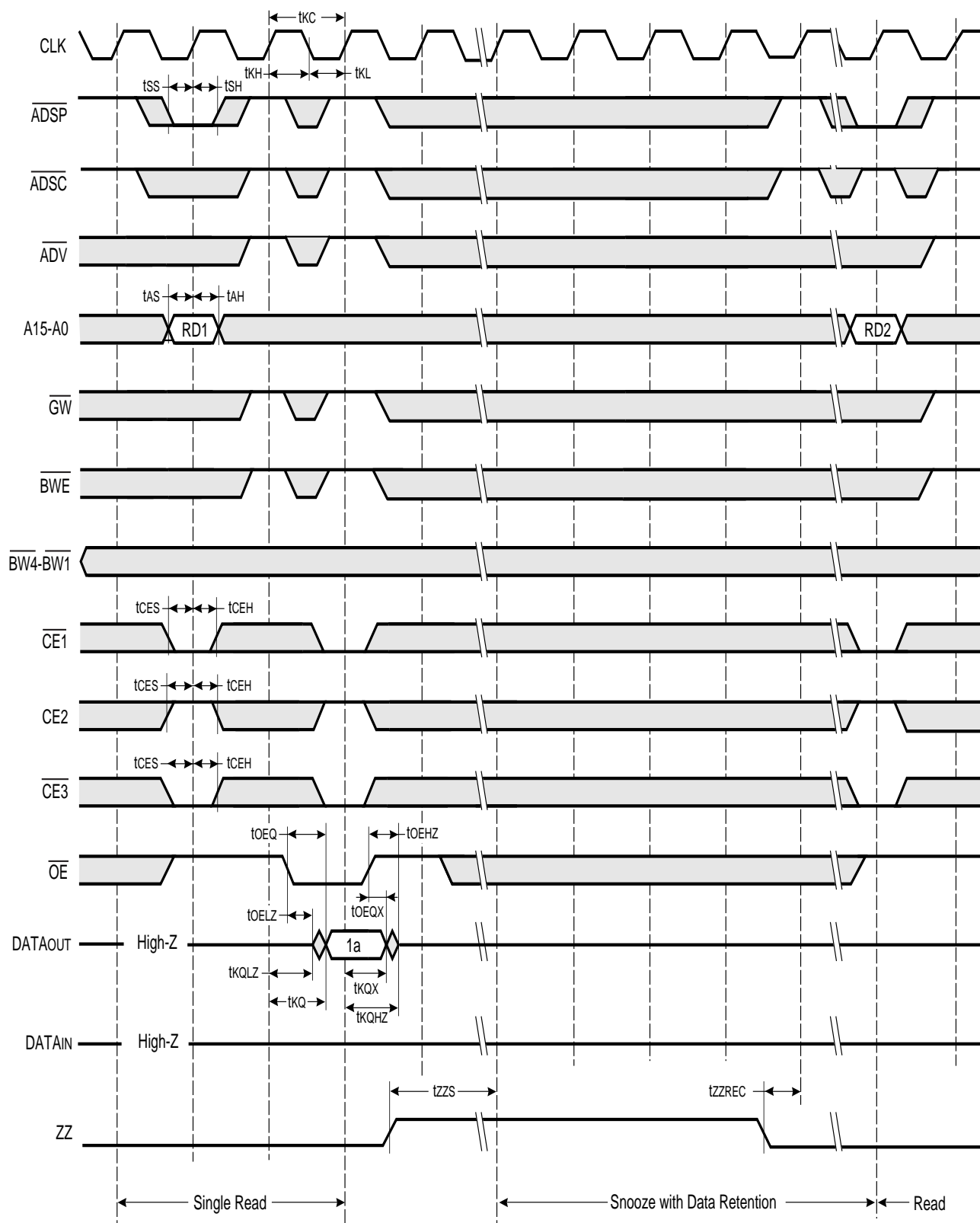
**SNOOZE AND RECOVERY CYCLE SWITCHING CHARACTERISTICS<sup>(1)</sup>** (Over Operating Range) *(Continued)*

| Symbol                            | Parameter                        | -5   |      | -6   |      | -7   |      | -8   |      | Unit |
|-----------------------------------|----------------------------------|------|------|------|------|------|------|------|------|------|
|                                   |                                  | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |      |
| t <sub>KC</sub>                   | Cycle Time                       | 10   | —    | 12   | —    | 13   | —    | 15   | —    | ns   |
| t <sub>KH</sub>                   | Clock High Time                  | 3.5  | —    | 4    | —    | 6    | —    | 6    | —    | ns   |
| t <sub>KL</sub>                   | Clock Low Time                   | 3.5  | —    | 4    | —    | 6    | —    | 6    | —    | ns   |
| t <sub>KQ</sub>                   | Clock Access Time                | —    | 5    | —    | 6    | —    | 7    | —    | 8    | ns   |
| t <sub>KQX</sub> <sup>(2)</sup>   | Clock High to Output Invalid     | 1.5  | —    | 1.5  | —    | 2    | —    | 2    | —    | ns   |
| t <sub>QLZ</sub> <sup>(2,3)</sup> | Clock High to Output Low-Z       | 0    | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>QHZ</sub> <sup>(2,3)</sup> | Clock High to Output High-Z      | 1.5  | 6    | 1.5  | 6    | 2    | 6    | 2    | 6    | ns   |
| t <sub>OEQ</sub>                  | Output Enable to Output Valid    | —    | 5    | —    | 6    | —    | 6    | —    | 6    | ns   |
| t <sub>OEQX</sub> <sup>(2)</sup>  | Output Disable to Output Invalid | 0    | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>ELZ</sub> <sup>(2,3)</sup> | Output Enable to Output Low-Z    | 0    | —    | 0    | —    | 0    | —    | 0    | —    | ns   |
| t <sub>EHZ</sub> <sup>(2,3)</sup> | Output Disable to Output High-Z  | —    | 4    | —    | 5    | —    | 6    | —    | 6    | ns   |
| t <sub>AS</sub>                   | Address Setup Time               | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>SS</sub>                   | Address Status Setup Time        | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>CES</sub>                  | Chip Enable Setup Time           | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>AH</sub>                   | Address Hold Time                | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>SH</sub>                   | Address Status Hold Time         | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>CEH</sub>                  | Chip Enable Hold Time            | 2.5  | —    | 2.5  | —    | 2.5  | —    | 2.5  | —    | ns   |
| t <sub>ZZS</sub> <sup>(4)</sup>   | ZZ Standby                       | 2    | —    | 2    | —    | 2    | —    | 2    | —    | cyc  |
| t <sub>ZZREC</sub> <sup>(5)</sup> | ZZ Recovery                      | 2    | —    | 2    | —    | 2    | —    | 2    | —    | cyc  |

**Notes:**

1. Configuration signal MODE is static and must not change during normal operation.
2. Guaranteed but not 100% tested. This parameter is periodically sampled.
3. Tested with load in Figure 2.
4. The assertion of ZZ allows the SRAM to enter a lower power state than when deselected within the time specified. Data retention is guaranteed when ZZ is asserted and clock remains active.
5. ADSC and ADSP must not be asserted for at least two cycles after leaving ZZ state.

## SNOOZE AND RECOVERY CYCLE TIMING



**ORDERING INFORMATION****Commercial Range: 0°C to +70°C**

| Frequency (MHz) | Order Part Number | Package          |
|-----------------|-------------------|------------------|
| 200             | IC61S6432-200TQ   | 14*20*1.4mm LQFP |
|                 | IC61S6432-200PQ   | 14*20*2.7mm PQFP |
| 166             | IC61S6432-166TQ   | 14*20*1.4mm LQFP |
|                 | IC61S6432-166PQ   | 14*20*2.7mm PQFP |
| 133             | IC61S6432-133TQ   | 14*20*1.4mm LQFP |
|                 | IC61S6432-133PQ   | 14*20*2.7mm PQFP |
| 117             | IC61S6432-117TQ   | 14*20*1.4mm LQFP |
|                 | IC61S6432-117PQ   | 14*20*2.7mm PQFP |
| 100             | IC61S6432-5TQ     | 14*20*1.4mm LQFP |
|                 | IC61S6432-5PQ     | 14*20*2.7mm PQFP |
| 83              | IC61S6432-6TQ     | 14*20*1.4mm LQFP |
|                 | IC61S6432-6PQ     | 14*20*2.7mm PQFP |
| 75              | IC61S6432-7TQ     | 14*20*1.4mm LQFP |
|                 | IC61S6432-7PQ     | 14*20*2.7mm PQFP |
| 66              | IC61S6432-8TQ     | 14*20*1.4mm LQFP |
|                 | IC61S6432-8PQ     | 14*20*2.7mm PQFP |

**ORDERING INFORMATION****Industrial Range: -40°C to +85°C**

| Frequency (MHz) | Order Part Number | Package          |
|-----------------|-------------------|------------------|
| 117             | IC61S6432-117TQI  | 14*20*1.4mm LQFP |
|                 | IC61S6432-117PQI  | 14*20*2.7mm PQFP |
| 100             | IC61S6432-5TQI    | 14*20*1.4mm LQFP |
|                 | IC61S6432-5PQI    | 14*20*2.7mm PQFP |
| 83              | IC61S6432-6TQI    | 14*20*1.4mm LQFP |
|                 | IC61S6432-6PQI    | 14*20*2.7mm PQFP |
| 75              | IC61S6432-7TQI    | 14*20*1.4mm LQFP |
|                 | IC61S6432-7PQI    | 14*20*2.7mm PQFP |
| 66              | IC61S6432-8TQI    | 14*20*1.4mm LQFP |
|                 | IC61S6432-8PQI    | 14*20*2.7mm PQFP |



***Integrated Circuit Solution Inc.***

HEADQUARTER:  
NO.2, TECHNOLOGY RD. V, SCIENCE-BASED INDUSTRIAL PARK,  
HSIN-CHU, TAIWAN, R.O.C.  
TEL: 886-3-5780333  
Fax: 886-3-5783000

BRANCH OFFICE:  
7F, NO. 106, SEC. 1, HSIN-TAI 5<sup>TH</sup> ROAD,  
HSICHIH TAIPEI COUNTY, TAIWAN, R.O.C.  
TEL: 886-2-26962140  
FAX: 886-2-26962252  
<http://www.icsi.com.tw>